

American (The) Ozone

THE  
AMERICAN  
Ozone Generator.

(PATENT APPLIED FOR.)

249

The Formula of Ozone is  $O_3$ ; that of Oxygen  $O_2$ .

HEKTOGRAPH COMPANY;

22 & 24 CHURCH STREET,

NEW YORK.



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## OZONE.

It is a well-known fact to scientists that whenever any disease becomes epidemic there is an absence of Ozone in the atmosphere; were it present disease could not exist in a malignant form. The pure air of the mountains differs from that in cities and malarial districts in that it possesses the element of Ozone which breathes life, health and vigor into the human system; and for years the generation of Ozone in a manner applicable to private and public buildings has been a problem which has disturbed the minds of the medical profession. By the aid of one of New York's most eminent physicians, we are able to offer to the public an **OZONE GENERATOR**, which possesses all the elements to be desired, viz: cheapness, simplicity and effectiveness.

It is small and compact, can be placed on a shelf in any room, and will supply Ozone in sufficient quantities to neutralize any foul air or dangerous gases that may exist. The fumes of the phosphorus being heavier than atmospheric air, as they are given off pass at once to the chemical solution in which the phosphorus is placed, and by means of its alkalinity the phosphorus acid is neutralized so that only Ozone escapes into the surrounding atmosphere.

No private residence, business house or public building should be without an Ozone generator, if for nothing else than as a preventive of disease. In the school room it is invaluable, making it as pure and fresh as mountain air.

The Generator is made in two sizes.

**No. 1, \$3 50. No. 2, \$5.00.**

Orders by mail or otherwise will receive prompt attention.

**HEKTOGRAPH CO., 22 & 24 Church St., N. Y.**

The importance of this agent in preservation of the public health, already well understood, will be made further to appear by perusal of the following considerations of the subject by eminent authorities.

# ON OZONE.

By DR. E. G. COOK.\*

## HISTORY OF OZONE.

Without going back to notice the "electrical odor" long before observed by Von Marum, the real discovery of ozone by that eminent chemist Schönbein, of Munich, dates in the latter part of the year 1839. He found that in the voltaic decomposition of water, "an odorous substance accompanied the oxygen evolved at the positive pole of the battery, and, because of this odor, he gave it the name of ozone." He also discovered that it is found wherever moist air passes over *Phosphorus*. "To Schönbein, therefore, belongs the honor of discovering ozone as a separate form of matter," identical, from whatever source derived.

In 1856, Andrews confirmed this identity, and in 1860 showed that it was denser than ordinary oxygen. The next year Dr. Oling suggested that the molecular formula of ozone was  $O_3$ , that of passive oxygen being  $O_2$ ; and in 1872 Sir Benjamin Brodie, after many careful experiments, confirmed this hypothesis, and found its density one-half greater than that of passive oxygen.

\* Vide U. S. Med. Invest., vol. 6, p. 370.

Science, since that day, has established the fact that ozone is the great disinfectant of the world, without which, the air would be too polluted for respiration, and the human family would soon become extinct. But, unceasingly as nature is elaborating this powerful and sanitary element of our atmosphere, it is often found to be entirely wanting in large cities and inhabited houses. The reason is obvious. Ozone is exhausted in combating various foul emanations from the earth itself, and the animal creation. The decomposition of animal and vegetable matter in connection with moisture, forms the chief source of these impurities, and thus of disease. Thus it is readily seen what an important part ozone fulfills in the economy of nature. Experience has taught us that pure and bracing air is found in elevated regions away from dense populations, and it is for the reason that ozone is there found in its normal atmospheric proportions. To supply this deficiency in towns and cities—to replace its waste in our homes, offices, public halls, hospitals, churches, school rooms, and on board ships sailing from foreign ports, and often charged with the deadly virus of cholera and yellow fever, is the great problem of sanitary science.

Wherever a foul odor or miasm exists, ozone

will seek it out and correct it. Experience has shown that by this agency, the most offensive sick room may be kept sweet and pure as mountain air. In all sleeping apartments and nurseries, ozone is rapidly exhausted, and nothing can supply its deficiency. Oxygen and nitrogen, in the proportion of nearly four to one, cannot antidote one element of foulness or disease. Even the best ventilated sleeping rooms, occupied by two only, become contaminated and offensive before morning. Pounds of effete matter have been thrown from our lungs and the pores of our bodies, and the ozone has been exhausted in neutralizing their poison.

With a pure ozone generator within or near our sleeping apartment, carbonic oxide and all impure emanations would never become appreciable, being destroyed as fast as thrown off, thus leaving the air pure and fit for respiration.

Ozone is the only true disinfectant known to our globe. Its power is sufficient to destroy even the *germs* of disease. This was conclusively shown by experiments made in Berlin, on the bodies of those who had died of typhoid fever. The ulcerated patches in the bowels were found, under the microscope, to swarm with animalcular life, but when brought under the influence of ozone, they died as if struck by lightning.

It has long been known that cholera, that fearful scourge, cannot spread in any region where the normal amount of ozone is present in the air. This proportion is nearly one to 700,000 by volume, or 450,000 by weight. It is now believed that not only the miasm of cholera, but those of scarlatina, diphtheria, typhoid, intermittent, and other malarial fevers, are equally under the control of ozone. If we glance at some of its physical properties, this may be more apparent.

Prof. Kedzie says : "Ozone will oxidize ammonia into nitrate of ammonia, and will in particular, neutralize ammoniacal compounds which are produced by the decomposition of ozotized organic matter. This power of ozone to oxidize the hydrogen compounds of sulphur, phosphorus and nitrogen, enables it to destroy the offensive products of animal decomposition. Thus it will instantly destroy the horrible smell of rotten eggs."

Schönbein, also, says he found that "air made foul by exposure one minute to four ounces of highly putrid meat, was disinfected by an equal volume of air containing only one part of ozone to 3,240,000 of air."

"Ozone is, therefore, the natural and effectual destroyer of axotized substances, which are

known to be a most fruitful cause of disease, and which are supposed to be the medium for propagating the germs of epidemic and contagious diseases." "I find also a fact not before observed, so far as I am aware, that ozone will, at ordinary temperatures, oxidize the deadly carbonic oxide into the comparatively innocent carbon dioxide or carbonic acid. Carbon oxide is one of the most deadly gases known. Unlike sulphuretted hydrogen, phosphoretted hydrogen, and ammonia of animal oxygen, it gives no warning of its presence by its odor, or other sensible property. The power of ozone to oxidize this deadly gas is a fact of prime importance in preserving the purity of our atmosphere."

Of its power as a disinfectant Fox says: "It is nature's great deodorizing and purifying principle, that oxidizes the emanations from decomposing animal and vegetable substances, with which the air is constantly being contaminated, thus rendering them innocuous. The atmosphere would be so polluted by its admixture with the noxious matters evolved during the putrefactive changes which are unceasingly taking place on the globe, as to be unfitted for sustaining animal life, were it not for the all-pervading influence of the great disinfectant, ozone."

In view of these wonderful deductions of scientific research, we see how important it is to our health to secure and live in an atmosphere charged with the requisite amount of ozone. This done, and we have destroyed many, if not all the malignant factors of disease. Thus protected, the period of infancy and childhood would no longer be exposed to its special peril and mortality; and diphtheria and scarlatina, those scourges of the nursery, would wholly disappear. Ozone attacks the poisonous emanations of these and kindred disorders with a fierce and consuming energy, making the sick room a safe and pleasant place for the nurse and family. Having used it in these and other putrid diseases, we *know* whereof we speak. According to the eminent authority of Prof. Yeomans, it literally "burns up" the poisonous gases and foul odors of decomposing matter.

#### WHY OZONE IS REQUIRED.

Decomposition is forever going forward in the world, and ruthlessly sending forth its vile and noxious gases. Wherever population congregates, ozone is proportionally deficient, having yielded up its own life in combating the elements of death. Even the best parts of our cities, and the superb mansions of the rich, cannot wholly shut out the foulness and contagion

born of filth and squalor. In our great palatial stores, thronged from morning to night with moving life, people often complain that the air is very oppressive. The atmosphere is full of carbonic oxide, carburetted hydrogen, and other impurities, thrown off by the surging mass of bodies, which the ozone, unreplenished, is unable to combat. So also with all our hotels. They are notoriously saturated with vile odors, and in the course of years the frescoed walls reek with poisonous exhalations, which no art can overlay. Ozone, and that alone, can permeate these immense stores and hotels with an atmosphere sweet and healthful as that of the retired country residence.

The public is still very ignorant on the subject of ventilation. It supposes that to admit *the air* to our dwellings is all that is necessary to secure a healthful condition, whereas the ozone is always deficient if not wholly wanting in the midst of a dense population, and oxygen and nitrogen, the great constituents of the atmosphere, cannot neutralize one element of filth and decay. True, by the distributive action of currents, foulness is diffused and *diluted*, but, without the cleansing power of ozone, the vast aerial ocean would soon become so poisonous as to destroy all human life.

**THE RELATIONS OF OZONE TO ANIMAL LIFE.**

In a concentrated form, ozone could no more be breathed than oxygen or nitrogen uncombined, or in a free state. Prof. Kedzie says that "in preparing it for class-room experiments he has often observed the symptoms of a common cold." It is very doubtful whether pure ozone in the air, as one part to 500,000 even, will ever produce catarrh. The irritation came, quite likely, not from the ozone, but from the impurities connected with its production. When found in nature's admirable proportion, it makes itself felt only by a most delicious freshness and purity that goes to our fingers' ends, and permeates our entire being.

THE SPECIAL RELATION OF OZONE TO DISEASE is one of great and paramount interest. That it bears a true sanitary value to the world must be inferred from finding it ever present in all healthful conditions of the atmosphere, and experiments, so far as made, greatly fortify this belief. Over scarlatina it is believed to have absolute control. All cases, so far as we have heard, have fully recovered by the sixth day, and in no instance were there any secondary symptoms. Cholera cannot spread where ozone is found, even in small amounts. In diphtheria and typhoid its effects have been most satisfac-

tory. For "hay fever" it is regarded by those who have tested it as nearly a specific, cutting short four-fifths of this dreaded malady. In intermittent fevers it is of inestimable value. As with cholera, it is thought to be the want of it in marsh regions which permits this particular disease to prevail. The conclusion is, that with ozone strong enough, in homes surrounded with marsh malaria, ague will cease to exist, and thus vast tracts of fertile, but disease-stricken soil, will become habitable.

Often, in our best and most tenderly guarded homes, "silently and unseen, disease is produced from poisoned and foul air." Says Burke, "The insidious, but often fatal effects of noxious gases from defective drains," (or covered-up water courses), "are pretty generally understood; yet it is often of little use to admonish the man of vigorous health of danger from a cause so remote or obscure."

Yet it is true that these emanations are silently sapping the foundation of the most robust constitutions. Not only will ozone neutralize these foul odors, but it will prevent almost wholly, it is believed, the spread of zymotic diseases.

The following statement, made by Dr. Gihon, medical inspector in the United States navy, is startling, but true of almost the whole marine service of the world :

"The forecastles of our merchant ships, of passenger steamers, and even of men-of-war, are gehennas of foulness and unwholesomeness. The air that the dwellers in the forecastle must breathe is tainted beyond belief. Ventilation is practically unknown. In naval vessels there are some air-ports in the forecastle, but these are always closed at sea. Lieutenant Meigs and Dr. Smith, of the U. S. navy, analyzed the air of these dens, and found eighteen to twenty-four parts of carbon dioxide to the thousand. It is putting the case mildly to say that this proportion shows from three to six times as great an amount of that pernicious gas as is found in air that chemists say is barely respirable. Into this confined space the bilge-water ventilators often discharge their foul gases; this was found to be the case on the flag-ship Franklin. Authorities are agreed that a healthy pair of human lungs ought to have twenty cubic feet of fresh air per minute. But it was found that on the smaller vessels of our navy the total cubic air space per man varied between ninety-six and fifty-five feet. On the larger frigates the air space was only 125 to 175 cubic feet per man—not enough to last a half hour. The natural effect is a prevalence of low fevers and consumption among seamen. The records of the Marine Hospital service show

that the average of sailors' sea-going lives is less than twelve years; and in that period over 200,000 American seamen die or are disabled by sickness. After making due allowance for their irregular habits, exposure and excesses; for the effect of sleeping in unchanged clothes; for the neglect of personal cleanliness; for unwholesome food; the great loss by illness and mortality cannot be explained except by ascribing it to the fact that our sailors sleep in poisoned air."

Ozone will correct all this, even preventing the necessity of quarantine. Thus we see how vast and beneficent is its mission.

But did ozone possess no power to eradicate and ameliorate disease, its *deodorizing* properties would give it front rank among the most beneficent discoveries of the age. How unsatisfactory the so-called disinfectants are, all know. Recent experiments show conclusively that *Carbolie acid*, *Chloride of Lime*, *Chlorine*, and other supposed agents of purification are, in truth, not such in any sense of the word; they only change or suppress the form of the odor, without rendering inert the essence of the contagion. Ozone, on the contrary, while possessing deodorizing qualities, pleasant beyond all others, is believed to be the true *disinfectant*, and *destroyer* of all infection.

Says Kedzie, "I call ozone the most energetic of the constituents of the atmosphere. Hozeau has found that it has forty times the bleaching power of chlorine. Compared with the normal constituents of the air, it is an agent of amazing power. Such a substance present in the air which bathes our bodies at all times, and which penetrates our lungs with every breath, must be, for good or ill, a force of singular power over the human frame. Its presence or absence in the atmosphere *must have a controlling influence over the vital powers.* And when we consider that this material is present in such *variable amount*, in a medium which enfolds us every moment of our lives, and whose action "pauses not for matin or for vesper, at noon of day or noon of night, it seems to me that no one can deny that its influence on human health must be most significant."

It seems impossible to exaggerate the importance of ozone to human welfare, and the interest attaching to all experiments which shall enlarge the knowledge of its beneficent properties. Which of all the discoveries, ancient and modern, surpasses this in wide-reaching philanthropy? It blesses the infant in its cradle, and pours freshness and vigor into the chilled veins of the aged. By its mysterious chemistry it changes

pollution into sweetness, and transforms waste places, now the abode of deadly spirits, into homes of health and beauty. It removes the offensiveness of the sick chamber, filling it with fresh and pleasant odors, and keeping the body of the loved sufferer sweet under the power of the foulest disease; and, finally, it prevents the sacred forms of our dead from becoming loathsome and harmful to us till they are laid away under the clods of the valley. Such is the great and benign agency of ozone.

PROF. YOUMANS says: "The most eminent sanitary authorities, as well as the ablest chemists, are certainly agreed that it is a

#### PURIFYING AGENT

of great efficiency in the atmosphere. The fact that it is never found in the air of dwellings, or where organic impurity abounds, is explained by supposing that in such places it is consumed or spent in oxidizing and destroying these impurities.

PROF. GEORGE COOK, of Boston, Mass., says: "That OZONE is 'Nature's great disinfectant,' is now universally understood among all scientific men. It is perhaps the only agent that effectually attacks and destroys

#### POISONOUS & OFFENSIVE EXHALATIONS

not only completely deodorizing all noxious smells, but decomposing and resolving into harm'less forms ALL IMPURITIES arising from privies, cesspools, sick rooms, and

### MALARIOUS INFECTIONS.

The bad air of school rooms, hospital wards, etc., is never perfectly purified by MERE VENTILATION ; by

### OZONE IT IS PERFECTLY DONE.

Hall's Journal of Health says : "The power of OZONE as a purifying agent may be imagined from the well demonstrated fact, that *one part* of OZONE is adequate to the purification of three million two hundred and forty thousand parts of PUTRID AIR!"

PROF. A. L. LOOMIS says : "OZONE purifies the air of a locality by destroying injurious gases, and by oxidizing decomposing organic substances. Therefore when choosing a health resort for phthisical invalids, we should give the preference to a locality in which there is constantly an excess of Ozone in the atmosphere, for, experience has established the fact that there the climate is especially salubrious."

The Allgemeine Medicinische Central-Zeitung reports a case of Hydrophobia cured by the administration of oxygen.

Fowne says: that "phosphorus acid is very deliquescent and prone to attract oxygen and pass into phosphoric acid," the latter being a most harmless agent.

We respectfully refer to the following well known gentlemen, who now have our Generators in their homes, some of whom have had them in use for 3 months.

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J. GUYON BENNETT, Esq.,

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